Analytical Tool for Measuring Emission Impacts of ACCEL/DECEL Lanes

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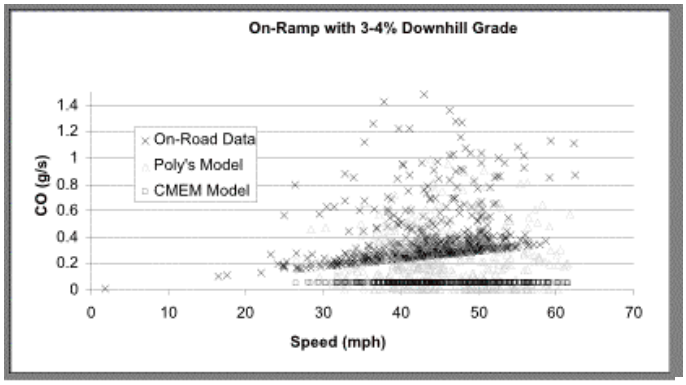
The MOBILE5 model, widely used in evaluating the impacts of transportation investments on air quality, is insensitive to the effects of acceleration or deceleration on emissions and thus cannot model the effects of improvements such as a reduction in grade. The problem with MOBILE is that it uses average speed as the only variable to represent driving dynamics which are strongly related to vehicle emissions. These dynamics are often not properly characterized by average speed. The objective of this study was to develop emission models that take acceleration/deceleration into account.

In this study, nonlinear regression models were developed to estimate emission factors of acceleration and deceleration. The models estimate the emissions associated with acceleration and deceleration by taking into account the time duration that the acceleration/deceleration has been sustained, acceleration/deceleration at the current time and in the past nine time periods, the grade, and the engine power at the current time. With this modeling approach, the validation results show that the emission model developed in this study can produce a close match to raw emissions data on both microscopic and macroscopic levels.



Emission CO vs. Speed

The models developed in the emission project were used in a later study at Texas Southern University:

Yu, L., L.A. Munghor, P. Yi, and H. Teng (2004) "Simulation-Based Evaluation of Applications of Electronic Energy Storage Devices in Buses for Reduced Emissions", Transportation Research Record 1887, pp 109-116.

Yi (Grace) Qi worked on the emission project with Dr. Hualiang Teng. She graduated with a Ph.D. degree and is working as a research associate at the University of Virginia. Dr. Qi received a Women's Society of Engineering award while at Polytechnic University and published significantly during her stay in New York.

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